

rejected as being obvious in view of Gibson in view of Reagan (EP 0608447). Reagan is said to disclose a complex of chromium or titanium used as a catalyst for oligomerizing ethylene. Both of these rejections are respectfully traversed.

The claimed invention is a process for making a linear alpha olefin oligomer in a reactor which must have both a liquid and a gas phase. The process comprises the steps of oligomerizing ethylene in the presence of a catalyst complex, which is selected from the group consisting of nickel, palladium, cobalt, titanium, zirconia, hafnium, vanadium, chromium, molybdenum, and tungsten complexes, to an alpha olefin oligomer in a reaction which involves the release of heat. The heat is removed with a heat exchanger which is not in direct contact with the liquid phase and the heat exchanger uses at least part of the gas phase as a coolant medium.

In the claimed invention, a liquid reaction medium is required (page 5, line 17). Some reaction may take place in the gas phase but the primary reaction medium is a liquid reaction medium.

As described on page 6, the heat exchanger, which is positioned such that it does not come into contact with the liquid reaction medium, uses conventional cooling fluids to cool the gas phase in the reactor. The gas phase is created by evaporation of solvents, reactants, and/or reaction products present in the liquid reaction medium by virtue of the release of heat during the reaction.

When the heat exchanger is placed inside the reactor, it is preferred that some condensation occurs on the heat exchanger surface. The cooled liquid will help to cool the gas. When the heat exchanger is placed outside the reactor, the gases are also condensed and the liquid condensate is returned to the reactor. In both cases, the condensate helps to cool the reaction mixture.

In Gibson, the reaction is clearly in the gas phase in a bed of catalyst (see page 12, lines 19-20). The catalyst bed is cooled by recycle of recycled gaseous monomer, i.e., unreacted monomer (see page 12, lines 16-17). The hot gas which leaves the reactor and which includes unreacted gaseous monomer is cooled but only to cooler gas and is not condensed (see page 14, lines 5-6).

Gibson does describe how the claimed polymerization catalyst could be used in the liquid phase such as in the slurry phase polymerization method described on pages 10, 11, and 12. However, after that description and beginning at line 10 of page 12, Gibson describes the operation of a gas phase polymerization process. This description continues on through the third line of page 15. It is only with respect to the gas phase fluidized bed process that Gibson describes the use of heat exchangers to cool gas which is then recycled as gas to the fluidized

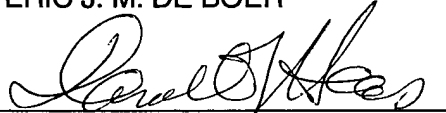
bed to cool the bed. At page 12, lines 18-20, Gibson clearly states that the gas phase polymerization zone is free from or substantially free from liquid.

Therefore, since the process of the present invention requires the presence of a liquid reaction medium, the processes of the present invention and of Gibson are different. Gibson's disclosed method of heat exchange and coolant does not involve condensation because Gibson's reaction is supposed to be liquid free. Therefore, the Applicants assert that Gibson does not suggest or disclose, even in combination with Reagan, the invention claimed in claims 1-7.

The Examiner is requested to remove the rejection and an early notice of allowance is respectfully requested.

Respectfully submitted,

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